# TECHNOLOGY LEADERSHIP: PRINCIPALS' CONCERNS IN LEADING SCHOOLS

Sailesh Sharma

This paper addresses the concerns of leading technology integration in Malaysian schools. It addresses the status of technology leadership of principals, their challenges and their training needs, to foster adequate technology integration by their teachers. The challenges and the subsequent training needs were discussed in depth to highlight the current status of technology leadership in Malaysian schools. The initiatives that could enhance and expedite the improvement process towards generating strings of technology leaders in the school to raise quality learning across Malaysia have also been discussed.

KEYWORDS: Technology Leadership, Training Needs, Strategies, Concerns

#### INTRODUCTION

The need of computer-literate graduates, and fear of economic loss without good computer skills, is pushing the Malaysian government to invest more heavily in computer technology. Despite government spending on technology tools and training of teachers, the technology integration in the Malaysian classrooms is still uneven, ranging from non-existent to some existence. Though there are some positive examples of technology being used to support student learning and to foster positive changes in schools, expectations such as computers would bring a revolution in public education have not materialized yet (Malaysia Education Blueprint, 2013-2025).

One thing is for sure, mere installation of computers and networks in schools would not result in the kind of educational reform that the government

#### 264 | Sailesh Sharma

wants to see. We need to seek exactly what should be done from the perspective of the school leaders as well as teachers based on research studies. Obstacles that limit as well as promoters that enhance technology integration in the classrooms can be identified and solutions and strategies can be worked out to ensure that the technology integration in schools is effective. Questions such as, "Are teachers on the rising end with respect to technology integration into their classroom with the wide access to technology tools?" and "What else is there to make these teachers more technology savvy and do a lot more teaching with technology?" can be a good beginning.

Malaysian school principals always aspire to be effective leaders running their organization with least problems or issues if not none. However, this requires them to be equipped with the relevant skills, knowledge and attitude in order to perform and provide their best practices for the enhancement of the school as a whole. The training and exposure that they are provided with may be challenged when we still find many of them to be lacking the appropriate skills to function as effective leaders. The Aminuddin Baki Institute that takes the most share of equipping the practitioners with the relevant skills and knowledge may have to ensure the translation of these skills into practices at the respective schools. If not, this issue of incompetency in terms of good practices may never find a permanent solution. Due to rapid transformation in schools due to technology, principals are needed to blend their routine leadership duties with technology integration in leadership and teaching learning process.

What are the approaches and strategies that these school leaders need to undertake to address this ongoing technology integration issue among their teachers? Questions like this and many others like, "Are the leaders aware of their specific leadership role to enhance technology integration in their schools?", "Do they have the knowledge and capacity to translate into effective strategies for technology integration in their schools?", and "What role do the school principals need to play to accomplish this?" may be a good start for further probe into this avenue. It is becoming a need of the hour that principals as school leaders must now integrate the traditional and the new skills through technology for a wide range of school outcomes. If this role is termed technology leadership, then to what extent the Malaysian school principals execute this technology leadership now? What are their main challenges in being a technology leader? What could be their training needs in order to perform as an effective technology leader?

Due to rapid increase in usage of technology in leading schools, technology leadership has gained substantial attention among school principals. In contrary to traditional systems of leading schools, principals need to lead the accountability parade in improving organizational performance, academic and service quality through optimum utilization of technology (Chang, 2012). In relation to these demands, school leaders of the information age are definitely facing strong challenges and only relevant corresponding and continuous training can really help them encounter these challenges.

Understanding clearly the tremendous capacities of ICT in enhancing the learning of a wide range of knowledge and thinking skills, the MOE has clearly endorsed in its 7th Shift of the Transformation of Education System (Malaysia Education Blueprint 2013-2025), that ICT will play a major role in improving the quality of learning across Malaysia. Hence, MOE proposes three major perspectives. First, providing internet access and virtual learning environments via 1-BestariNet for all schools. Second, promoting online content to teachers in delivering lessons in Malay, Mathematics, English and Science. Third, maximizing use of online and self-paced learning for wider access in Malaysia. The mandate to integrate computer technology into every subject and grade does fall onto the shoulders of both principals and teachers. They face huge challenges in ensuring that this transformation created by the new technologies takes place in their schools. Increasingly, this task falls on the school leaders as they are expected to assume the leadership responsibilities. Further, the MOE looks upon to the school leaders to help in the accomplishment of the 7th Shift in their Transformation of Education System, though there is no explicit mention of this in the blueprint. Can the school leaders perform this heavy task, especially when they are unfamiliar, and for which they have received little or no training? In this paper, the author seeks to address the status of technology leadership among Malaysian principals, some of the challenges and the training needs of the school leaders in relation to their emerging role as technology leaders to foster better technology integration among their teachers.

Dynamic leadership has been argued as an important element to bring successful school reforms through technology (Anderson & Dexter, 2005; Hughes, McLeod, Dickers, Brahler, & Whiteside, 2005). It appears that principals' technology leadership strongly correlates to teachers' technology integration into their curriculum (Rogers, 2000; Chang, 2004, 2011). Principals' technological leadership has a significant and positive influence on teachers' information technology literacy (Wu, 2009). This is further supported by some significant studies in Malaysia (Kannan, 2002; Rossafri & Balakrishnan, 2007; Kamala, 2008; Leong, 2010; Jamil, 2011 & Nazri, 2011). Malaysian studies on technology leadership and its influence on a wide range of school outcomes have significantly contradicted the study by Banoglu (2011) in Turkey, which claims low mean for the leadership and vision dimension in the NETS-A when

#### 266 | Sailesh Sharma

tested for competency in technology leadership among 134 school principals in Istanbul (Banoglu, 2011).

However, the results of technology leadership studies are mixed. Without much doubt, technology leadership is emerging within the increasingly diversified educational leadership world as efforts to change and prepare schools and students for the information age demand effective technology leadership skills from the principals. Indeed, technology leadership is vital for effective use of technology and therefore, principals who aim to facilitate and accomplish school reforms should have technology leadership abilities (Ross & Bailey, 1996).

## THE STATUS

Between 2007 and 2011, several research studies were conducted to study the technology leadership status among Malaysian school principals using the earlier NETS-A standards, 2002 (the one with six standards). Almost all these researchers (Abd. Manaf, 2014; Jamil, 2011; Kamala, 2008; Leong, 2010; Mohd. Izham & Rusnah, 2007; Nazri, 2011; Norazah, Yusma, & Kamaruzaman, 2010; and Traci & Chan, 2007) found similar results that concluded that school leaders only displayed average strength in their technology leadership roles in selected dimensions/ avenues only. For example, using data collected from 63 secondary school administrators to measure the level of administrators' Technology Leadership, Mohd. Izham and Rusnah (2007) and Norazah, Yusma and Kamaruzaman (2010) identified that some of the technology leadership elements do exist in Malaysian secondary schools. Furthermore, their findings indicated that school administrators scored average on the Leadership and Vision, and Teaching and Learning dimensions but below average on the Productivity Practice dimension.

Based on a mixed method approach, a study was conducted by on a secondary school in one district in the state of Negeri Sembilan, Malaysia to identify the role of principal's technology leadership. She reported that the teachers perceived that their principal was performing technology leader role at the average level. The results showed that the principal performed at moderate level in three out of the six dimensions of technology standard for school administrators (TSSA, 2001). The three dimensions are Leadership and Vision; Teaching and Learning; and Assessment and Evaluation while the other three dimensions that where principals performed at very low levels of technology leadership are Social, Legal and Ethical Issues, Support, Management and Operations and Productivity and Professional practice.

A study by Jamil (2011) showed that the principals in smart schools performed at higher level only in the Productivity and Professionalism dimension, while at a moderate level in other five dimensions of Leadership and Vision; Social, Legal, and Ethical Issues, Support, Management, and Operations; Learning and Teaching; and Assessment and Evaluation. In contrast, Leong (2010) found that the principal in a normal day school, performed at higher level in only the Social, Legal and Ethical Issues while in the other five dimensions the performances were at moderate level. Traci and Chan (2007), in their study on technology leadership found that aspiring principals' perceptions on their leadership development programme, found that the aspiring principals advocated the dimensions of Support, Maintenance, and Operations, and Assessment and Evaluation as important and demanded for special emphasis on these dimensions than the others.

Using NETS.A (2002) Standard as the theoretical framework, conducted a survey on 41 principals of "Maktab Rendah Sains MARA" to examine the level of principals' technology leadership. The overall results showed that the level of principals' technology leadership of these principals was average. Besides, the results also indicated that these principals showed above average level in two out of six dimensions of principals' technology leadership. The two dimensions are Professional Practices and Productivity, and Support, Management and Operation dimensions. The other four dimensions (Assessment and Evaluation; Leadership and Vision; Teaching and Learning; and social, legal, and ethical issues) were at average level.

Moktar (2011) investigated the principal's technology role as a role model, change leader and staff development supporter in a religious secondary school in Kuching, Sarawak. Data were collected from 55 teachers using a set of questionnaires. The results indicated that the principal demonstrated high level of technology leadership. Similar finding was reported in Nazri's study, who conducted a survey to determine the level of principal's technology leadership in the ICT implementation process. The data collected from 90 teachers in a secondary school located at Kuala Krai, Kelantan were analysed. The results indicated that principal in this school demonstrated a high level of technology leadership in the ICT implementation process. Besides that, multiple regression analysis showed that three of the principal's technology leadership dimensions Teaching and Learning (2.6%) Productivity and Professional Practice (7.0%) and Assessment and Evaluation (56.0%), contributed to 65.6% of variance in the level of ICT implementation in that particular school.

These findings were further supported by Faridah who examined the level of technology leadership practices among 96 administrators from 12 high performing schools in Malaysia using the NETS.A (2002) as the theoretical framework. The results showed that the level of technology leadership practices demonstrated by these administrators was high. The Teaching and Learning dimension showed the highest mean, followed by Support, Management, and Operations, Leadership and Vision, Productivity and Professional Practice, Assessment and Evaluation, and Social, Legal and Ethical Issues dimension. Her result on Social, Legal and Ethical Issues dimension contradicted that of Leong's (2010) study which found that Social, Legal and Ethical Issues dimension scored the highest mean among the six NETS.A dimensions.

These earlier studies are wonderful indications that the school leaders were lazy and less competent in showing their technology leadership in every dimension/ avenue that is present and available to them. Perhaps, it proves that they are innocent about the available avenues for showing their strength as technology leaders and therefore they need to further explore the possibilities for improving their leadership aspect.

# THE CHALLENGES

Leading the list of challenges for the school leaders to improve technology integration into teaching and learning is knowing how to be effective technology leaders. For that, first of all, the school leaders need to be cognizant of what is a technology leader's role and how does a technology leader ensure continuous support to the teachers for effective integration of technology into teaching and learning. What are the things he/she should be doing? Since the whole concept of being a technology leader is still new to this part of the world, it would be better to check out what the technology leaders from other developed parts of the world are doing and what are the guidelines that they are referring to, in relation to their role as technology leaders.

The International Society for Technology in Education (ISTE) has come up with some standards for the educational administrators. These standards known as National Educational Standards for Administrators (NETS ·A) provide the necessary guidelines which are the basic requirements for administrators to perform their role as technology leaders. Though these standards are not mandatory for the Malaysian school principals, they too can use this (NETS ·A) as a guide when executing technology leadership in their schools. As a pure guide, these standards can enlist some avenues for the school principals to exercise their role as technology leaders. Despite some exceptions, most of the standards and the related details mentioned in the standards are usable for different contexts.

The avenues mentioned above refer to the following standards in the NETS A, 2009. As can be seen below, the standards proposed in the NETS A

do provide clear understanding as well as clear indication of how to carry out their responsibilities in relation to a particular standard.

- 1. Visionary Leadership: where educational administrators inspire and lead development and implementation of a shared vision for comprehensive integration of technology to promote excellence and support transformation throughout the organization (ISTE, 2009).
- 2. Digital Age Learning Culture: where educational administrators create, promote, and sustain a dynamic, digital-age learning culture that provides a rigorous, relevant, and engaging education for all students (ISTE, 2009).
- **3.** Excellence in Professional Practice: where educational administrators promote an environment of professional learning and innovation that empowers educators to enhance student learning through the infusion of contemporary technologies and digital resources (ISTE, 2009).
- **4. Systemic Improvement:** where educational administrators provide digital age leadership and management to continuously improve the organization through the effective use of information and technology resources (ISTE, 2009).
- **5. Digital Citizenship:** where educational administrators model and facilitate understanding of social, ethical and legal issues and responsibilities related to an evolving digital culture (ISTE, 2009).

The second challenge for the principals lies in providing the appropriate professional development to the teachers in order for them to integrate technology into their teaching. Before deciding on the professional development targeted to improve teachers' technology integration, the leaders have to understand the reaction of teachers and its development towards new technologies and innovations. It is of utmost importance that they understand the process of adoption of new technologies and innovations by individual teachers into their work. In the past, failure to understand this fact has resulted in many attempts to adopt new reforms and initiatives that started with high hopes on the leaders' end eventually ending otherwise. This is because they do not realize that implementing a new programme or change successfully involves more than providing the staff with materials, resources, and training. An often-overlooked factor is the human element i.e. the people who are actually doing the work. In schools, it is the teachers who are individuals responding to a new programme or change with unique attitudes and beliefs, and each teacher will adopt the new programme differently. Therefore, the leader needs to understand this phenomenon and must gauge the teachers' concerns and their levels of use of the new technology/ innovation in order to give each person the necessary support to ensure success (Kannan, 2002). Concerns refer to "the composite representation of feelings, preoccupation, thought, and consideration given to a particular issue or task" (Hall, George, & Rutherford, 1986; Hall & Hord, 2011).

Teachers may respond to new technology/ innovation in many ways, from stress and anxiety at one end to cynicism and burnout on the other. Only leaders who have understood the Concerns Theory (Hall et al, 1986) can identify teachers concerns and provide targeted support to help individual teachers cope and focus on the task at hand. Using the Stages of Concern (SoC), school leaders can assess and respond to the worries, attitudes, and perceptions of teachers as they deal with the challenges of using the technology in the classroom for better student learning. In the Concerns Based Adoption Model (CBAM) by Hall et al. (1986), the SoC consists of and describes seven categories of possible concerns related to an innovation/change. People who are in the earlier stages of a change process will likely have more worries about whether they can learn the new technology or how it will affect their job performance (self-focused concerns). As individuals become more and more comfortable with and skilled in using the innovation, their concerns shift from self to task and then to impact concerns that eventually focus on how the initiative will affect their students or their working relationships with colleagues (the broader impact concerns) (Hall & Hord, 2011). Therefore, before providing any support in the form of professional development to the teachers, as advocated in the concerns theory, it is wise to align the support to their present concerns with regards to the new technology/innovation. Hall & Hord (2011) put it well by saying,

"How leaders address the potential arousal of self-concerns, task-concerns and eventually impact concerns can make all the difference in ultimate implementation success and effectiveness". (p.55).

The third challenge revolves around the leader's own awareness in the process of change. Awareness is the first phase of any intended change. When a leader becomes aware of what competency one requires to lead the process of change, one will then move through the next phase where one assesses the knowledge and skills that will make him/her ready for the proposed change. In terms of the knowledge and skills related to ICT applications, Rossafri and Balakrishnan (2007) observed that most of Malaysian school principals are highly uncomfortable in enacting their role as technology leaders and display a low level of technology leadership capacities. These authors further argue that lack of competencies and willingness to be actively involved in implementing technology in leadership processes hinders such principals in leading innovations and change process and marks such inabilities as alarming.

On the other hand, if the leaders decide to pursue the knowledge and skills required of them, then the change is very likely to be facilitated by the leaders since they assume active participation and accountability for making the change a reality. Leadership for change generally motivates the teachers for their active involvement in the use of technology and in turn enhancing their performances as a teacher in delivering high quality results in academic and professional discourse. Such leaders further serve as role model and transformational leaders (Kannan, Sharma, & Zuraidah, 2012).

The next challenge for the school leaders in being effective technology leaders encompasses knowing and employing successfully the many strategies that are available for leading technology integration among the teachers. In relation to their emerging roles as technology leaders, they have to know and be competent to employ them successfully. In her study, Kozloski (2006) identified that there are three strategies i.e. modelling, creating opportunity, and promoting that are being used by principals to lead technology integration in their schools. By investigating these three strategies in the Malaysian context, Kannan et al. (2012) further confirmed that these strategies are being employed by the Malaysian principals quite unknowingly to increase the involvement of their teachers towards effective integration of technology into teaching and learning. However, it was the modelling strategy that was found to be on the higher end. Next, came creating opportunity, followed by promoting which was on the lower end.

In conjunction with these three strategies, a number of related skills were illuminated in the study. For example, under the modelling strategy, the study indicated that principals modelled the way for the technology integration among their teachers by using the technology to a greater extent. Besides it enabled principals in decisions making based on data analysis, for school management purposes, for communicating information with teachers, to perform teacher evaluations, to access important information or for taking notes at meetings and for personal organization. Similarly in the creating opportunity strategy, the study found that skills such as building opportunities for collaboration between colleagues, providing need full support to teachers in their professional growth, promoting opportunities for teachers to equip them with skills on integrating technology, mobilizing need based access to technology for best practice in school, developing professional learning community in the school for technology integration, ensuring sufficient time for teachers to practice ICT integration skills, collaborating in the planning, designing, implementing, and supporting professional development of the teachers who lead ICT integration among the teachers.

### 272 | Sailesh Sharma

The third strategy of promoting, in turn, was also found to be helpful to the principals in displaying their technology leadership responsibilities. Among others, skills that really contributed here include allocating ICT resources to enable teachers to better integrate ICT, developing vision for ICT integration by working with teachers, providing sufficient, quality support services for ICT integration, changing teachers' perspectives, getting additional allocation of ICT resources, arranging additional input such as interactive whiteboard & LCD projector, helping teachers in using ICT to their academic matters to interpret and improve student performance.

The challenges discussed above naturally identify and list out the demands of technology leaders in executing their role with more involvement and concern.

### THE TRAINING NEEDS

The scenario that is explained under the heading 'The Status' earlier in this paper calls for an awareness programme for technology leadership to be introduced and implemented as a catalyst to more rigorous training later in the future. The school leaders have to be informed of this awareness programme to create the right awareness and consequently raise their concerns towards equipping them for their technology leadership roles. Once the leaders begin to assume serious participation as technology leaders, by knowing the various avenues to venture their strength as technology leaders, there is a need to equip them with the relevant knowledge and skills. According to Flanagan and Jacobsen (2003), professional development programmes must be organized for school principals to effectively inspire and lead their teachers in integrating technology across the curriculum and help them to develop the knowledge, dispositions and skills. There is great need for continuous leadership professional development to inculcate competencies and dispositions towards technology leadership and its implications.

At the moment the only training arm responsible for the exposure and development of Malaysian school principals is the Aminuddin Baki Institute (commonly addressed as IAB). The spectrum of training at this training arm includes almost all skills that are considered useful and needed by the principals except for the technology leadership aspects. There are elements of technology related skills in their modules, but they are more aligned to the technological skills and not technology leadership elements. That means, IAB has to prepare itself to launch their new modules for training principals with technology leadership skills that would lead the teachers to integrate more technology into their teaching-learning in their respective schools. Principals' technology leadership skills seem to improve teachers' technological literacy development (Chang & Hsu, 2009; Wu, 2009) and directly influences teachers to integrate technology into their teaching (Chang, 2011).

Another institute that provided some exposure and training on technology leadership skills is the Institute of Educational Leadership within University of Malaya (formerly known as Institute of Principalship Studies) where the graduates had a chance to get some awareness regarding this emerging technology leadership role and the related skills. Though providing exposure and training at this institute remains an ongoing process, it is felt that more exposure and specific training of technology leadership skills should be made to practicing principals as well through a rigid agenda by designing short term courses on technology leadership, perhaps with the help of experts from CASTLE (Centre for Advanced Technology Leadership in Education) located at the University of Kentucky, USA. In March 2012, a two-day workshop was successfully initiated and conducted, with two experts from CASTLE, to create some awareness and exposure regarding technology leadership among practicing school heads and principals. Similar short-term courses need to be embarked along the training path of each and every principal if we want our principals to be effective technology leaders. A study by Kannan et al. (2012) revealed that principals who have undergone some technological literacy training at IAB seem to be performing better than those who did not attend any training of the sort in the strategy of modelling. However, Kannan et al. (2012) contends,

"Many Malaysian school leaders are still uncomfortable providing leadership in technology areas. They may be uncertain about implementing effective technology leadership strategies in ways that will improve learning. They may even believe that their own knowledge of technology is inadequate to make meaningful recommendations." (p.114).

### CONCLUSION

The status, challenges, and the training needs addressed in this article simply suggest a need for a special and national agenda for continuous efforts by the Ministry of Education, Malaysia (MOE) towards implementing effectively ICT integration a policy in every school. Though, it is clearly the national agenda, as shown in the Malaysia Education Blueprint 2013-2025, the initiatives should be more focused and at the same time more aligned with some of the theories discussed in the paper. With that note, the author believes that MOE should provide need-based technology leadership training to the school principals in a continuous manner so that the nation will be able to develop technology leaders who can meaningfully lead school by

ICT integration for better student outcomes. Consequently, the MOE's expectations and reliance upon school leaders to help in the accomplishment of the 7th Shift in their transformation of education system can therefore take place more successfully.

# REFERENCES

- Abd. Manaf, A. (2014). *The level of principals' technology leadership in Maktab Rendah Sains Mara.* Unpublished Masters in Principalship Project, University of Malaya.
- Anderson, R. E., & Dexter, S. L. (2005). School technology leadership: An empirical investigation of prevalence and effect. *Educational Administration Quarterly*, 41(1), 49-82.
- Banoglu, K. (2011). School principals' technology leadership competency and technology coordinatorship. *Educational Sciences: Theory & Practice*, 11(1), 208-213.
- Chang, I. H. (2012). The effect of principals' technological leadership on teachers' technological literacy and teaching effectiveness in Taiwanese elementary schools. *Educational Technology & Society*, 15 (2), 328–340.
- Chang, I., & Hsu, C. (2009). Research on the path of the influence of principals' technology leadership on teachers' information technology literacy in metropolitan elementary schools. *Journal of Elementary Education*, 33, 1-32.
- Chang, T. (2004). A study of the relationship between principals' information literacy and the implementation of information technology integrating into teaching (Unpublished master's thesis). National Taichung Teachers College, Taiwan.
- Faridah, J. (2011). Technology leadership of school administrators in high performing schools. Unpublished Master's Thesis, National University of Malaysia, Bangi.
- Flanagan, L., & Jacobsen, M. (2003). Technology leadership for the twentyfirst century principal. *Journal of Educational Administration*, 41(2), 124–142.
- Hall. & Hord. (2011). Implementation: Learning builds the bridge between research and practice. *JSD The Learning Forward Journal*, 32(4), 52-57.
- Hall, G.E., George, A.A., & Rutherford, W.L. (1986). Measuring stages of concern about the innovation: A manual for the use of the SoC questionnaire.

Austin, TX: Southwest Educational Development Laboratory.

- Hughes, J. E., McLeod, S., Dikkers, A. G., Brahier, B., & Whiteside, A. (2005). School technology leadership: Theory to practice. *Academic Exchange Quarterly*, 9(2), 51-55.
- International Society for Technology in Education (2009). *National educational technology standards for administrators*. Retrieved May 20, 2014 from http:// cets.iste.org/tssa/pdf/tssa.pdf.
- Jamil, S. (2011). Principal's technology leadership in a smart school at Kota Tinggi, Johor. Unpublished Masters in Principalship Project, University of Malaya.
- Kamala, S. (2008). Principal as a technology leader in a secondary school in Labu District, Negeri Sembilan. Unpublished Masters in Principalship Project, University of Malaya.
- Kannan, S. (2002). A study of managing ability to integrate computer into teaching-learning among smart school teachers. *Educational Leadership and Management Journal*, *12*(2), 126-151.
- Kannan, S., Sharma, S., & Zuraidah, A. (2012). Principal's strategies for leading ICT integration: The Malaysian perspective. *Creative Education*, 3, 111-115.
- Kozloski, C. K. (2006). *Principal leadership for technology integration: A study of principal technology leadership.* PhD Thesis, Drexel University.
- Leong, M.W. (2010). *Principal technology leadership and teachers' ICT application in a secondary school in Seremban*. Unpublished Masters in Principalship Project, University of Malaya.
- Ministry of Education Malaysia. (2013). *Malaysia Education Blueprint* 2013-2025 (*Preschool to Post-Secondary Education*). Putrajaya.
- Moktar, J. (2011). *Technology leadership and teachers' ICT competency in a religious secondary school in Kuching, Sarawak.* Unpublished Masters in Principalship Project, University of Malaya.
- Mohd. Izham, M. H., & Rusnah, A. K. (2007). Administrators as technology leader: Concept and practices. Paper presented at the 1st International Malaysian Educational Technology Convention, Johor Bahru, Malaysia.
- Nazri, B. (2011). *Principal technology leadership and the implementation of ICT in a school*. Unpublished Masters in Principalship Project, University of Malaya.

- Norazah, N., Yusma, Y., & Kamaruzaman, J. (2010). A quantitative analysis of Malaysian secondary school technology leadership. *Management Science and Engineering*, 4(2), 124-130.
- Rogers, B. A. (2000). *The correlation between teachers' perceptions of principals' technology leadership and the integration of educational technology* (Unpublished doctoral dissertation). Ball State University, Indiana.
- Rossafri, M., & Balakrishnan, M. (2007). Translating technology leadership to create excellent instructional leadership. *Educational Leadership and Management Journal*, *17*(2), 91-103.
- Ross, T. W., & Bailey, G. D. (1996). Technology-based learning: A handbook for teachers and technology leaders (Rev. ed.). Arlington Heights, IL: IRI/Skylight.
- Traci, R. & Chan, C. T. (2007). Technology Leadership: Aspiring Administrators' Perception. *Journal for the Integration of Technology in Education*, 6(3), 123-139.
- Wu, S. (2009). A study of the relationship between principals' technological leadership and teachers' technological literacy in elementary schools in Taipei County (Unpublished master's thesis). Fu Jen Catholic University, Taiwan.
- Yee, D. L. (2000). Images of school principals' information and communications technology leadership. *Journal of Information Technology for Teacher Education*, 9(3), 287–302.